WHAT IS CLAIMED IS:

1. An adjustment method of characteristics of a multistage Mach-Zehnder interferometer type optical circuit that includes:

a first input/output optical waveguide pair;

a second input/output optical waveguide pair;

M directional couplers disposed between said first and second input/output optical waveguide pairs, where M is an integer equal to or greater than two; and

(M-1) phase control means, each of which is disposed between two adjacent directional couplers of said M directional couplers, is attached to at least one of two optical waveguides of the optical waveguide pair placed between said adjacent directional couplers, and controls relative phase of light beams passing through a first optical waveguide and a second optical waveguide of said optical waveguide pair in response to a phase control signal, wherein

said adjacent directional couplers, said phase control means disposed between said adjacent directional couplers, and said optical waveguide pairs that are disposed between said directional couplers and have same optical path lengths constitute symmetrical Mach-Zehnder type optical interferometers, whereas said adjacent directional couplers, said phase control means disposed between said adjacent directional

couplers, and said optical waveguide pairs that are disposed between said directional couplers and have different optical path lengths constitute asymmetrical Mach-Zehnder type optical interferometers, and (M-1) Mach-Zehnder type optical interferometers are connected in cascade to construct said multistage Mach-Zehnder interferometer type optical circuit, said adjustment method of the characteristics of the multistage Mach-Zehnder interferometer type optical circuit comprising:

a first step of sequentially carrying out, for each of said symmetrical Mach-Zehnder interferometers, setting of the phase control signal based on a correlation between the phase control signal of said phase control means disposed in said symmetrical Mach-Zehnder interferometer and optical intensity output from a first optical waveguide of said second input/output optical waveguide pair disposed in an output side of said multistage Mach-Zehnder interferometer type optical circuit, after inputting low coherence light, which has a coherence length shorter than a minimum optical path length difference between said asymmetrical Mach-Zehnder interferometers, from a first optical waveguide of said first input/output optical waveguide pair disposed at an input side of said multistage Mach-Zehnder interferometer type optical circuit;

a second step of sequentially carrying out, for each of said asymmetrical Mach-Zehnder interferometers, setting of the phase control signal based on a correlation between the phase control signal of said phase control means disposed in said asymmetrical Mach-Zehnder interferometer and optical intensity output from one of first and second optical waveguides of said second input/output optical waveguide pair disposed in the output side of said multistage Mach-Zehnder interferometer type optical circuit, after inputting wavelength tunable coherent light from one of first and second optical waveguides of said first input/output optical waveguide pair disposed at the input side of said multistage Mach-Zehnder interferometer type optical circuit; and

a third step of optimizing the individual phase control signals of said phase control means to achieve a desired characteristic of the output light from said multistage Mach-Zehnder interferometer type optical circuit based on the correlations between the phase control signals and output light intensity obtained at the first step and the second step.

2. The adjustment method of the characteristics of the multistage Mach-Zehnder interferometer type optical circuit as claimed in claim 1, wherein

an optical input to said multistage Mach-Zehnder

interferometer type optical circuit at the first step and the second step is carried out by using optical path switching means including two optical input sections and two optical output sections and capable of selecting an optical path between the optical input sections and the optical output sections, in which said two optical input sections are connected to the low coherence light and the wavelength tunable coherent light, respectively, said two optical output sections are connected to said first input/output optical waveguide pair, and said optical path switching means carries out optical path switching to select one of the low coherence light and the wavelength tunable coherent light as the input light.

3. The adjustment method of the characteristics of the multistage Mach-Zehnder interferometer type optical circuit as claimed in claim 1, wherein

the setting of each of the phase control signals at the first step is carried out in response to the optical output intensity from the first optical waveguide of said second input/output optical waveguide pair such that the phase control signal of said phase control means disposed in said symmetrical Mach-Zehnder interferometer makes an intensity-coupling ratio of said symmetrical Mach-Zehnder interferometer equal to one of 0% and 100%; and

the setting of each of the phase control signals

at the second step is carried out such that an intensity-coupling ratio of two of said symmetrical Mach-Zehnder interferometers adjacent to both ends of each of said asymmetrical Mach-Zehnder interferometers becomes 50%, and intensity-coupling ratios of the symmetrical Mach-Zehnder interferometers other than the two symmetrical Mach-Zehnder interferometers become one of 0% and 100%, by setting the phase control signals of the phase control means disposed in said symmetrical Mach-Zehnder interferometers based on the correlations obtained at the first step, and such that intensity-coupling ratios of said asymmetrical Mach-Zehnder interferometers become one of 0% and 100%.

4. The adjustment method of the characteristics of the multistage Mach-Zehnder interferometer type optical circuit as claimed in claim 3, wherein

an optical input to said multistage Mach-Zehnder interferometer type optical circuit at the first step and the second step is carried out by using optical path switching means including two optical input sections and two optical output sections and capable of selecting an optical path between the optical input sections and the optical output sections, in which said two optical input sections are connected to the low coherence light and the wavelength tunable coherent light, respectively, said two optical output sections are connected to said

first input/output optical waveguide pair, and said optical path switching means carries out optical path switching to select one of the low coherence light and the wavelength tunable coherent light as the input light.

5. The adjustment method of the characteristics of the multistage Mach-Zehnder interferometer type optical circuit as claimed in claim 1, wherein

the settings of the phase control signals at the first step and the second step are each carried out sequentially from said phase control means disposed in the output side of said multistage Mach-Zehnder interferometer type optical circuit toward said phase control means disposed in the input side of said multistage Mach-Zehnder interferometer type optical circuit.

6. The adjustment method of the characteristics of the multistage Mach-Zehnder interferometer type optical circuit as claimed in claim 5, wherein

an optical input to said multistage Mach-Zehnder interferometer type optical circuit at the first step and the second step is carried out by using optical path switching means including two optical input sections and two optical output sections and capable of selecting an optical path between the optical input sections and the optical output sections, in which said two optical

input sections are connected to the low coherence light and the wavelength tunable coherent light, respectively, said two optical output sections are connected to said first input/output optical waveguide pair, and said optical path switching means carries out optical path switching to select one of the low coherence light and the wavelength tunable coherent light as the input light.

7. The adjustment method of the characteristics of the multistage Mach-Zehnder interferometer type optical circuit as claimed in claim 3, wherein

the settings of the phase control signals at the first step and the second step are each carried out sequentially from said phase control means disposed in the output side of said multistage Mach-Zehnder interferometer type optical circuit toward said phase control means disposed in the input side of said multistage Mach-Zehnder interferometer type optical circuit.

8. The adjustment method of the characteristics of the multistage Mach-Zehnder interferometer type optical circuit as claimed in claim 7, wherein

an optical input to said multistage Mach-Zehnder interferometer type optical circuit at the first step and the second step is carried out by using optical path switching means including two optical input sections

and two optical output sections and capable of selecting an optical path between the optical input sections and the optical output sections, in which said two optical input sections are connected to the low coherence light and the wavelength tunable coherent light, respectively, said two optical output sections are connected to said first input/output optical waveguide pair, and said optical path switching means carries out optical path switching to select one of the low coherence light and the wavelength tunable coherent light as the input light.

9. An adjustment method of characteristics of a multistage Mach-Zehnder interferometer type optical circuit that includes:

a first input/output optical waveguide pair;

a second input/output optical waveguide pair;

2(N+1) directional couplers disposed between said first and second input/output optical waveguide pairs, where N is an integer equal to or greater than one; and

(2N+1) phase control means, each of which is disposed between two adjacent directional couplers of said 2(N+1) directional couplers, is attached to at least one of two optical waveguides of the optical waveguide pair placed between said adjacent directional couplers, and controls relative phase of light beams passing through a first optical waveguide and a second optical waveguide of said optical waveguide pair in response

to a phase control signal, wherein

said adjacent directional couplers, said phase control means disposed between said adjacent directional couplers, and said optical waveguide pairs that are disposed between said directional couplers and have same optical path lengths constitute symmetrical Mach-Zehnder type optical interferometers, whereas said adjacent directional couplers, said phase control means disposed between said adjacent directional couplers, and said optical waveguide pairs that are disposed between said directional couplers and have different optical path lengths constitute asymmetrical Mach-Zehnder type optical interferometers, and (N+1) said symmetrical Mach-Zehnder type optical interferometers and N said asymmetrical Mach-Zehnder type optical interferometers are alternately connected in cascade to construct said multistage Mach-Zehnder interferometer type optical circuit, said adjustment method of the characteristics of the multistage Mach-Zehnder interferometer type optical circuit comprising:

a first step of sequentially carrying out, for each of said symmetrical Mach-Zehnder interferometers, setting of the phase control signal based on a correlation between the phase control signal of said phase control means disposed in said symmetrical Mach-Zehnder interferometer and optical intensity

output from a first optical waveguide of said second input/output optical waveguide pair disposed in an output side of said multistage Mach-Zehnder interferometer type optical circuit, after inputting low coherence light, which has a coherence length shorter than a minimum optical path length difference between said asymmetrical Mach-Zehnder interferometers, from a first optical waveguide of said first input/output optical waveguide pair disposed at an input side of said multistage Mach-Zehnder interferometer type optical circuit;

a second step of sequentially carrying out, for each of said asymmetrical Mach-Zehnder interferometers, setting of the phase control signal based on a correlation between the phase control signal of said phase control means disposed in said asymmetrical Mach-Zehnder interferometer and optical intensity output from one of first and second optical waveguides of said second input/output optical waveguide pair disposed in the output side of said multistage Mach-Zehnder interferometer type optical circuit, after inputting wavelength tunable coherent light from one of first and second optical waveguides of said first input/output optical waveguide pair disposed at the input side of said multistage Mach-Zehnder interferometer type optical circuit; and

a third step of optimizing the individual phase

control signals of said phase control means to achieve a desired characteristic of the output light from said multistage Mach-Zehnder interferometer type optical circuit based on the correlations between the phase control signals and output light intensity obtained at the first step and the second step.

10. The adjustment method of the characteristics of the multistage Mach-Zehnder interferometer type optical circuit as claimed in claim 9, wherein

an optical input to said multistage Mach-Zehnder interferometer type optical circuit at the first step and the second step is carried out by using optical path switching means including two optical input sections and two optical output sections and capable of selecting an optical path between the optical input sections and the optical output sections, in which said two optical input sections are connected to the low coherence light and the wavelength tunable coherent light, respectively, said two optical output sections are connected to said first input/output optical waveguide pair, and said optical path switching means carries out optical path switching to select one of the low coherence light and the wavelength tunable coherent light as the input light.

11. The adjustment method of the characteristics of the multistage Mach-Zehnder interferometer type

optical circuit as claimed in claim 9, wherein

the setting of each of the phase control signals at the first step is carried out in response to the optical output intensity from the first optical waveguide of said second input/output optical waveguide pair such that the phase control signal of said phase control means disposed in said symmetrical Mach-Zehnder interferometer makes an intensity-coupling ratio of said symmetrical Mach-Zehnder interferometer equal to one of 0% and 100%; and

the setting of each of the phase control signals at the second step is carried out such that an intensity-coupling ratio of two of said symmetrical Mach-Zehnder interferometers adjacent to both ends of each of said asymmetrical Mach-Zehnder interferometers becomes 50%, and intensity-coupling ratios of the symmetrical Mach-Zehnder interferometers other than the two symmetrical Mach-Zehnder interferometers become one of 0% and 100%, by setting the phase control signals of the phase control means disposed in said symmetrical Mach-Zehnder interferometers based on the correlations obtained at the first step, and such that intensity-coupling ratios of said asymmetrical Mach-Zehnder interferometers become one of 0% and 100%.

12. The adjustment method of the characteristics of the multistage Mach-Zehnder interferometer type

optical circuit as claimed in claim 11, wherein

an optical input to said multistage Mach-Zehnder interferometer type optical circuit at the first step and the second step is carried out by using optical path switching means including two optical input sections and two optical output sections and capable of selecting an optical path between the optical input sections and the optical output sections, in which said two optical input sections are connected to the low coherence light and the wavelength tunable coherent light, respectively, said two optical output sections are connected to said first input/output optical waveguide pair, and said optical path switching means carries out optical path switching to select one of the low coherence light and the wavelength tunable coherent light as the input light.

13. The adjustment method of the characteristics of the multistage Mach-Zehnder interferometer type optical circuit as claimed in claim 9, wherein

the settings of the phase control signals at the first step and the second step are each carried out sequentially from said phase control means disposed in the output side of said multistage Mach-Zehnder interferometer type optical circuit toward said phase control means disposed in the input side of said multistage Mach-Zehnder interferometer type optical circuit.

14. The adjustment method of the characteristics of the multistage Mach-Zehnder interferometer type optical circuit as claimed in claim 13, wherein

an optical input to said multistage Mach-Zehnder interferometer type optical circuit at the first step and the second step is carried out by using optical path switching means including two optical input sections and two optical output sections and capable of selecting an optical path between the optical input sections and the optical output sections, in which said two optical input sections are connected to the low coherence light and a light source of the wavelength tunable coherent light, respectively, said two optical output sections are connected to said first input/output optical waveguide pair, and said optical path switching means carries out optical path switching to select one of the low coherence light and the wavelength tunable coherent light as the input light.

15. The adjustment method of the characteristics of the multistage Mach-Zehnder interferometer type optical circuit as claimed in claim 11, wherein

the settings of the phase control signals at the first step and the second step are each carried out sequentially from said phase control means disposed in the output side of said multistage Mach-Zehnder

interferometer type optical circuit toward said phase control means disposed in the input side of said multistage Mach-Zehnder interferometer type optical circuit.

16. The adjustment method of the characteristics of the multistage Mach-Zehnder interferometer type optical circuit as claimed in claim 15, wherein

an optical input to said multistage Mach-Zehnder interferometer type optical circuit at the first step and the second step is carried out by using optical path switching means including two optical input sections and two optical output sections and capable of selecting an optical path between the optical input sections and the optical output sections, in which said two optical input sections are connected to the low coherence light and a light source of the wavelength tunable coherent light, respectively, said two optical output sections are connected to said first input/output optical waveguide pair, and said optical path switching means carries out optical path switching to select one of the low coherence light and the wavelength tunable coherent light as the input light.

17. A multistage Mach-Zehnder interferometer type optical circuit comprising:

a first input/output optical waveguide pair;

a second input/output optical waveguide pair;

M directional couplers disposed between said first and second input/output optical waveguide pairs, where M is an integer equal to or greater than two; and

(M-1) phase control means, each of which is disposed between two adjacent directional couplers of said M directional couplers, is attached to at least one of two optical waveguides of the optical waveguide pair placed between said adjacent directional couplers, and controls relative phase of light beams passing through a first optical waveguide and a second optical waveguide of said optical waveguide pair in response to a phase control signal, wherein

said adjacent directional couplers, said phase control means disposed between said adjacent directional couplers, and said optical waveguide pairs that are disposed between said directional couplers and have same optical path lengths constitute symmetrical Mach-Zehnder type optical interferometers, whereas said adjacent directional couplers, said phase control means disposed between said adjacent directional couplers, and said optical waveguide pairs that are disposed between said directional couplers and have different optical path lengths constitute asymmetrical Mach-Zehnder type optical interferometers, and (M-1) Mach-Zehnder type optical interferometers are connected in cascade to construct said multistage

Mach-Zehnder interferometer type optical circuit, wherein

said symmetrical Mach-Zehnder type optical interferometers and said asymmetrical Mach-Zehnder type optical interferometers connected in cascade are subjected to the characteristic adjustment according to the method as defined in claim 1.

18. A multistage Mach-Zehnder interferometer type optical circuit comprising:

a first input/output optical waveguide pair;

a second input/output optical waveguide pair;

2(N+1) directional couplers disposed between said first and second input/output optical waveguide pairs, where N is an integer equal to or greater than one; and

(2N+1) phase control means, each of which is disposed between two adjacent directional couplers of said 2(N+1) directional couplers, is attached to at least one of two optical waveguides of the optical waveguide pair placed between said adjacent directional couplers, and controls relative phase of light beams passing through a first optical waveguide and a second optical waveguide of said optical waveguide pair in response to a phase control signal, wherein

said adjacent directional couplers, said phase control means disposed between said adjacent directional couplers, and said optical waveguide pairs

that are disposed between said directional couplers and have same optical path lengths constitute symmetrical Mach-Zehnder type optical interferometers, whereas said adjacent directional couplers, said phase control means disposed between said adjacent directional couplers, and said optical waveguide pairs that are disposed between said directional couplers and have different optical path lengths constitute asymmetrical Mach-Zehnder type optical interferometers, and (N+1) said symmetrical Mach-Zehnder type optical interferometers and N said asymmetrical Mach-Zehnder type optical interferometers are alternately connected in cascade to construct said multistage Mach-Zehnder interferometer type optical circuit, wherein

said (N+1) symmetrical Mach-Zehnder type optical interferometers and said N asymmetrical Mach-Zehnder type optical interferometers connected in cascade are subjected to the characteristic adjustment according to the method as defined in claim 9.